

Attorney Docket No.: 422.05

PATENT



Sheet 1 of 1

FORM PTO-1449 (Rev. 7-80) Trademark Office	U.S. Dept. of Commerce Patent and Trademark Office	Appl. Docket No. 422.05	Appl. No. 10/050,654
LIST OF REFERENCES CITED BY APPLICANT (Use several sheets if necessary)		Applicant: CHEN, Ling, et al.	
		Filing Date: Jan 16, 2002	

	Document Number	Date	Name	Class	Subclass	Filing Date
THM	4,058,430	15-Nov-1977	Method For Producing Compound Thin Films			25-Nov-1977
	4,389,973	28-Jun-1983	Apparatus For Performing Growth of Compound Thin Films			11-Dec-1981
	4,413,022	1-Nov-1983	Method For Performing Growth of Compound Thin Films			21-Jun-1979
	4,767,494	30-Aug-1988	Preparation process of compound semiconductor			19-Sep-1986
	4,806,321	21-Feb-1989	Use of infrared radiation and an ellipsoidal reflection mirror			25-Jul-1985
	4,840,921	20-Jun-1989	Process for the growth of III-V group compound semiconductor crystal on a Si substrate			30-Jun-1988
	4,845,049	4-Jul-1989	Doping III-V compound semiconductor devices with group VI monolayers using ALE			28-Mar-1988
	4,859,627	22-Aug-1989	Group VI doping of III-V semiconductors during ALE			1-Jul-1988
	4,861,417	29-Aug-1989	Method of growing group III-V compound semiconductor epitaxial layer			24-Mar-1988
	4,876,218	24-Oct-1989	Method of growing GaAs films on Si or GaAs substrates using ALE			26-Sep-1988
	4,993,357	19-Feb-1991	Apparatus for atomic layer epitaxial growth			21-Dec-1989
	5,082,798	21-Jan-1992	Crystal growth method			27-Sep-1990
	5,130,269	14-Jul-1992	Hetero-epitaxially grown compound semiconductor substrate and a method of growing the same			25-Apr-1989
	5,166,092	24-Nov-1992	Method of growing compound semiconductor epitaxial layer by atomic layer epitaxy			30-Oct-1990
	5,225,366	6-Jul-1993	Apparatus For and a Method of Growing Thin Films Elemental Semiconductors			22-Jun-1990
	5,250,148	5-Oct-1993	Process for growing GaAs monocrystal film			12-Nov-1991
	5,256,244	26-Oct-1993	Production of diffuse reflective coatings by atomic layer epitaxy			10-Feb-1992
	5,270,247	14-Dec-1993	Atomic layer epitaxy of compound semiconductor			8-Jul-1992
	5,278,435	11-Jan-1994	High responsivity ultraviolet gallium nitride detector			8-Jun-1992
	5,281,274	25-Jan-1994	Atomic Layer Epitaxy (ALE) Apparatus For Growing Thin Films of Elemental Semiconductors			4-Feb-1993
	5,290,748	1-Mar-1994	Polymerization catalyst for olefines			16-Jul-1992
	5,294,286	15-Mar-1994	Process for forming a thin film of silicon			12-Jan-1993
	5,300,186	5-Apr-1994	Hetero-epitaxially grown compound semiconductor substrate and a method of growing the same			7-Apr-1992
THM	5,316,793	31-May-1994	Directed Effusive Beam Atomic Layer Epitaxy System and Method			27-Jul-1992

RECEIVED
APR 22 2002
TC 1700

RPTD 919103

Attorney Docket No.: 422.05

OTPE
APR 17 2002
JC100-TC

PATENT

<i>THM</i>	5,330,610	19-Jul-1994	Method of Digital Epitaxy by Externally Controlled Closed-Loop Feedback			28-May-1993
	5,336,324	9-Aug-1994	Apparatus for depositing a coating on a substrate			4-Dec-1991
	5,338,389	16-Aug-1994	Method of epitaxially growing compound crystal and doping method therein			21-Apr-1993
	5,374,570	20-Dec-1994	Method of manufacturing active matrix display device using insulation layer formed by the ale method			19-Aug-1995
	5,395,791	7-Mar-1995	Growth of II VI laser diodes with quantum wells by atomic layer epitaxy and migration enhanced epitaxy			20-Oct-1993
	5,438,952	8-Aug-1995	Method of growing a semiconductor layer			31-Jan-1994
	5,443,033	22-Aug-1995	Semiconductor crystal growth method			11-Mar-1994
	5,458,084	17-Oct-1995	X-ray wave diffraction optics constructed by atomic layer epitaxy			9-Dec-1993
	5,480,818	2-Jan-1996	Method for forming a film and method for manufacturing a thin film transistor			9-Feb-1993
	5,480,818	2-Jan-1996	Method for forming a film and method for manufacturing a thin film transistor			9-Feb-1993
	5,483,919	16-Jan-1996	Atomic layer epitaxy method and apparatus			17-Aug-1994
	5,484,664	16-Jan-1996	Hetero-epitaxially grown compound semiconductor substrate			21-Jan-1994
	5,532,511	2-Jul-1996	Semiconductor device comprising a highspeed static induction transistor			23-Mar-1995
	5,637,530	10-Jun-1997	II-VI compound semiconductor epitaxial layers having low defects, method for producing and devices utilizing same			10-Jun-1996
	5,693,139	2-Dec-1997	Growth of doped semiconductor monolayers			15-Jun-1993
	5,705,224	6-Jan-1998	Vapor Depositing Method			31-Jan-1995
	5,711,811	27-Jan-1998	Method and Equipment For Growing Thin Films			28-Nov-1995
	5,730,802	24-Mar-1998	Vapor growth apparatus and vapor growth method capable of growing a compound semiconductor layer having an evenness and an interfacial sharpness in units of atomic layers with good productivity			27-Dec-1996
	5,744,192	28-Apr-1998	Method of using water vapor to increase the conductivity of copper deposited with CU(HFAC) TMVS			8-Nov-1996
	5,851,849	22-Dec-1998	Process for Passivating Semiconductor Laser Structures with Severe Steps in Surface Topography			22-May-1997
	5,855,680	5-Jan-1999	Apparatus For Growing Thin Films			28-Nov-1995
	5,879,459	9-Mar-1999	Vertically-stacked process reactor and cluster tool system for atomic layer deposition			29-Aug-1997
	5,916,365	29-Jun-1999	Sequential Chemical Vapor Deposition			16-Aug-1996
	6,015,590	18-Jan-2000	Method for growing thin films			28-Nov-1995
	6,025,627	15-Feb-2000	Alternate method and structure for improved floating gate tunneling devices			29-May-1998
<i>THM</i>	6,036,773	14-Mar-2000	Method for growing Group III atomic			27-Mar-1997

RECEIVED
APR 22 2002
TC 1700

RECEIVED
APR 22 2002
TC 1700

919103

Attorney Docket No.: 422.05

OIPE
APR 17 2002
P-100

PATENT

			layer			
TAM	6,042,652	28-Mar-2000	Atomic layer deposition apparatus for depositing atomic layer on multiple substrates			7-Sep-1999
	6,043,177	28-Mar-2000	Modification of zeolite or molecular sieve membranes using atomic layer controlled chemical vapor deposition			21-Jan-1997
	6,090,442	18-Jun-2000	Method of growing films on substrates at room temperatures using catalyzed binary reaction sequence chemistry			2-Oct-1997
	6,110,530	29-Aug-2000	CVD method of depositing copper films by using improved organocopper precursor blend			25-Jun-1999
	6,113,977	5-Sep-2000	Method of growing a ZnS:Mn phosphor layer for use in thin-film electroluminescent components			11-Sep-1997
	6,124,158	26-Sep-2000	Method of reducing carbon contamination of a thin dielectric film by using gaseous organic precursors, inert gas, and ozone to react with carbon contaminants			8-Jun-1999
	6,124,158	26-Sep-2000	Formation of thin dielectric film on semiconductor substrate, includes introducing gaseous organic precursor to form bonded reactant, introducing second gaseous reactant into the reaction chamber with the bonded reactant			8-Jun-1999
	6,130,147	10-Oct-2000	Methods for forming group III-V arsenide-nitride semiconductor materials			18-Mar-1997
	6,139,700	31-Oct-2000	Method of and apparatus for forming a metal interconnection in the contact hole of a semiconductor device			30-Sep-1998
	6,143,659	7-Nov-2000	Method for manufacturing aluminum metal interconnection layer by atomic layer deposition method			27-Aug-1998
	6,174,377	16-Jan-2001	Processing Chamber for Atomic Layer Deposition Processes			4-Jan-1999
	6,174,809	16-Jan-2001	Method for forming metal layer using atomic layer deposition			15-Dec-1998
	6,197,683	6-Mar-2001	Method of forming metal nitride film by chemical vapor deposition and method of forming metal contact of semiconductor device using the same			18-Sep-1998
	6,200,893	13-Mar-2001	Radical-assisted Sequential CVD			11-Mar-1999
	6,203,613	20-Mar-2001	Atomic layer deposition with nitrate containing precursors			19-Oct-1999
	6,207,302	27-Mar-2001	Electroluminescent device and method of producing the same			2-Mar-1998
	6,248,605	19-Jun-2001	Method of growing thin film electroluminescent structures			2-Jun-1999
	6,270,572	7-Aug-2001	Method for manufacturing thin film using atomic layer deposition			9-Aug-1999
	6,287,965	11-Sep-2001	Method of forming metal layer using atomic layer deposition and semiconductor device having the metal layer as barrier metal layer or upper or lower electrode of capacitor			23-Feb-2000
TAM	6,291,876	18-Sep-2001	Electronic devices with composite atomic barrier film and process for making same			20-Aug-1998
	6,305,314	23-Oct-2001	Apparatus and concept for			17-Dec-1999

RECEIVED
APR 28 2002
TC 1700

RECEIVED
APR 22 2002
TC 1700

JAN P

9/9/03

Attorney Docket No.: 422.05

OTPE
APR 17 2002
PATENT

PATENT

			minimizing parasitic chemical vapor deposition during atomic layer deposition			
TJM	6,306,216	23-Oct-2001	Apparatus for deposition of thin films on wafers through atomic layer epitaxial process		12-Jul-2000	TC 1700
TJM	6,316,098	13-Nov-2001	Molecular layer epitaxy method and compositions		23-Mar-1999	TC 1700

FOREIGN PATENT DOCUMENTS						
	Document Number	Publication Date	Country	Class	Subclass	Translation Yes No
TJM	04424901		E.P.			
	07996411		E.P.			
	499294A*		E.P.			
	2,355,727		G.B.			
	11269652A*		JP			
	2001062244A1		JP			
	4031396A		JP			
	62091495A		JP			
	199110510		P.C.T.			
	199901595		P.C.T.			
	199929924		P.C.T.			
	200127347A		P.C.T.			
	200015865		P.C.T.			
	200015881		P.C.T.			
	200016377		P.C.T.			
	200055895		P.C.T.			
	200063957		P.C.T.			
	200079019A		P.C.T.			
	200079576		P.C.T.			
	200115220A		P.C.T.			
	200127346A		P.C.T.			
	200129280A		P.C.T.			
	200136702		P.C.T.			
	200140541		P.C.T.			

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

Author/Title	Citation	Date
J.W. Elam, C.E. Nelson, R.K. Grubbs, S.M. George Nucleation and growth during tungsten atomic layer deposition of SiO ₂ surfaces	Thin Solid Films 386 (2001) 41-52	2001
J.W. Klaus, S.J. Ferro, S.M. George Atomic layer deposition of tungsten using sequential surface chemistry with a sacrificial stripping reaction	Thin Solid Films 360 (2000) 145-153	2000
S.P. Denbaars, A. Hariz, C. Beyler, B.Y. Maa, Q. Chen, and P.D. Dapkus The growth of AlGaAs/GaAs heterostructures by atomic layer epitaxy	Mat. Res. Soc. Symp. Proc. Vol. 102, 527-532	1988
T. Suntola and M. Simpson Atomic Layer Epitaxy	Blackie and Son	1990
T.I. Hukka, R.E. Rawles, M.P. D'Evelyn Novel method for chemical vapor deposition and atomic layer epitaxy using radical chemistry	Thin Solid Films 225 (1993) 212-218	25-Mar-93
N. Kobayashi, T. Makimoto, Y. Yamauchi, and Y. Horikoshi Investigation of growth processes in flow-rate modulation epitaxy and atomic layer epitaxy by new in-situ optical monitoring method	Acta Polytechnica Scandinavica, Chemical Technology and Metallurgy Series, No. 195 (1990), pp. 139-144	01-Jun-90
D.T.J. Hurle Handbook of Crystal Growth 3: Thin Films and Epitaxy Part B: Growth Mechanisms and Dynamics, Chapter 14 (Atomic Layer Epitaxy)	Elsevier Science B.V.	1994
C.H. Liu, M. Yokoyama, and Y.K. Su Effect of Atomic Layer Epitaxy Growth Conditions on the Properties of ZnS Epilayers on (100)-Si Substrate	Jpn. J. Appl. Phys. Vol 35 (1996) pp. 5416-5420	1996
J.W. Klaus, A.W. Ott, J.M. Johnson, and S.M. George Atomic layer controlled growth of SiO ₂ films using binary reaction sequence chemistry	Appl. Phys. Lett. 70 (9), 3 March 1997	03-Mar-97

9/9/03

RECEIVED
APR 22 2002
TC 1700

RECEIVED
APR 23 2002
TC 1700

Attorney Docket No.: 422.05

PATENT

OTPE JC100
APR 17 2002
PATENT

S. Yamaga and A. Yoshikawa Atomic layer epitaxy of ZnS by a new gas supplying system inflow pressure metalorganic vapor phase epitaxy	Journal of Crystal Growth 117 (1992) 152-155 /	1992
S. Nishikawa, H. Kakinuma, T. Watanabe, and K. Nihei Preparation of a-Si:H/a-Si _x Cx:H Superlattices	Jpn.J.Appl.Phys. Vol. 25 No. 8 (August 1986) pp. 1141-1143 /	01-Aug-86
A. Watanabe, T. Izu, M. Hata, T. Kamijoh, and Yoshifumi The mechanism of self-limiting growth of atomic layer epitaxy of GaAs by metalorganic molecular beam epitaxy using trimethylgallium and arsine	Jpn.J.Appl.Phys. Vol. 28 No. 7 (July 1989) pp. L 1080 -L 1082 /	01-Jul-89
J. Nishizawa, H. Abe, and T. Kurabayashi Molecular layer epitaxy	J. Electrochem. Soc.: Solid State Science and Technology Vol. 132, No. 5 (May 1985) 1197-1200 /	01-May-85
K. Kodama, M. Ozeki, K. Mochizuki, and N. Ohtsuka In situ x-ray photoelectron spectroscopic study of GaAs grown by atomic layer epitaxy	Appl. Phys. Lett. 54 (7) (13 February 1989) 656-657 /	13-Feb-89
J. Creighton, K. Lykke, V. Shamamian, and B. Kay Decomposition of trimethylgallium on the gallium-rich GaAs (100) surface: implications for atomic layer epitaxy	Appl. Phys. Lett. 57 (3) (16 July 1990) 279-281	16-Jul-90
J.T. Yates, C.C. Cheng, Q. Gao, M.L. Colaianni, and W.J. Choyke Atomic H: a reagent for the extraction of chemical species from Si surfaces	Thin Solid Films 225 (1993) 150-154	1993
T. Suntola Cost-effective processing by atomic layer epitaxy	Thin Solid Films 225 (1993) 96-98	1993
S. Imai, T. Iizuka, O. Sugiura, and M. Matsumura Atomic layer epitaxy of Si using atomic H	Thin Solid Films 225 (1993) 168-172	1993
H. Nagasawa and Y. Yamaguchi Atomic level epitaxy of 3C-SiC by low pressure vapour deposition with alternating gas supplyi	Thin Solid Films 225 (1993) 230-234	1993
T. Suntola Development challenges of atomic layer epitaxy	Acta Polytechnica Scandinavica, Chemical Technology and Metallurgy Series, No. 195 (1990), pp. 93-106	01-Jun-90
J. Wisser, P. Czuprin, W. Richter, and P. Balk Pulsed flow epitaxy of InP in a standard LP-MOVPE reactor	Acta Polytechnica Scandinavica, Chemical Technology and Metallurgy Series, No. 195 (1990), pp. 123-129	01-Jun-90
H. Yokoyama, M. Shinohara, and N. Inoue Atomic layer epitaxy of GaAs using nitrogen carrier gas	Appl. Phys. Lett. 59(17) (21 October 1991) 2148-2149	21-Oct-91
M. de Keijser and C. van Opdorp Atomic layer epitaxy of gallium arsenide with the use of atomic hydrogen	Appl. Phys. Lett. 58 (11), 18 March 1991, 1187-1189	18-Mar-91
E. Colas, R. Bhat and B.J. Skromme; G.C. Nihous Atomic layer epitaxy of device quality GaAs	Appl. Phys. Lett. 55 (26), 25 December 1989, 2769-2771	25-Dec-89
P.C. Colter, S.A. Hussien, A. Dip, M.U. Erdogan, W.M. Duncan and S.M. Bedair Atomic layer epitaxy of device quality GaAs with a 0.6 um/h growth rate	Appl. Phys. Lett. 59(12), 16 September 1991, 1440-1442	16-Sep-91
S.M. Bedair, M.A. Tischler, T. Katsuyama, and N.A. El-Masry Atomic layer epitaxy of III-V binary compounds	Appl. Phys. Lett. 47 (1), 1 July 1985	01-Jul-85
M. Ozeki, K. Mochizuki, N. Ohtsuka, and K. Kodama Kinetic processes in atomic-layer epitaxy of GaAs and AlAs using a pulsed vapor-phase method	J. Vac. Sci. Technol. B, Vol. 5, No. 4, Jul/Aug 1987	01-Jul-87
Colin H.L. Goodman Atomic Layer epitaxy	J. Appl. Phys. 60 (3), 1 August 1986	01-Aug-86
S.M. Rossnagel, A. Sherman and F. Turner Plasma-enhanced atomic layer deposition of Ta and Ti for interconnect diffusion barriers	J. Vac. Sci. Technol. B, 18(4), Jul/Aug 2000	01-Jul-00
R. Ares, C.A. Tran and S.P. Watkins Determination of growth parameters for atomic layer epitaxy using reflectance difference spectroscopy	Can. J. Phys. (Suppl.) 74: S85-S88 (1996)	1996
I. Bhat, S. Akram	Journal of Crystal	1994

RECEIVED
APR 22 2002
C 1700

RECEIVED
APR 22 2002
TC 1700

9/9/03

Attorney Docket No.: 422.05



PATENT

Atomic layer epitaxial growth studies of ZnSe using diethylzinc and hydrogen selenide	Growth 138 (1994) 127-130	
S.P. Watkins, T. Pinnington, J. Hu, P. Yeo, M. Kluth, N.J. Mason, R.J. Nicholas, P.J. Walker Infrared single wavelength gas composition monitoring for metalorganic vapour-phase epitaxy	Journal of Crystal Growth 221 (2000) 166-171	2000
D. Rajavel, A. Conte, C.J. Summers Pyrolysis characteristics of iodine precursors for gas source n-type doping of II-VI compounds	Journal of Crystal Growth 140 (1994) 327-335	1994
M. Leskela, M. Ritala ALD precursor chemistry: Evolution and future challenges	J. Phys. IV France 9 (1999) Pr8-837-Pr8-852	21-Jun-05
C.H. Liu, M. Yokoyama, Y.K. Su, and N.C. Lee Atomic Layer Epitaxy of ZnS by low-pressure horizontal metalorganic chemical vapor deposition	Jpn. J. Appl. Phys. Vol. 35 (1996) pp.2749-2753, Part 1, No. 5A, May 1996	01-May-96
A. Watanabe, T. Isu, M. Hata, T. Kamijoh, and Y. Katayama The Mechanism of self-limiting growth of atomic layer epitaxy of GaAs by metalorganic molecular beam epitaxy using trimethylgallium and arsine	Japanese Journal of Applied Physics, Vol. 28, No. 7, July, 1989, pp. L 1080-L 1082.	01-Jul-89
M. Ozeki, K. Mochizuki, N. Ohtsuka, and K. Kodama Kinetic processes in atomic-layer epitaxy of GaAs and AlAs using a pulsed vapor-phase method	J. Vac. Sci. Technol. B 5(4), Jul/Aug 1987	Jul/Aug 1987

Examiner 	Date Considered 9/9/03
* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

USCOMM-DC 80-3985

RECEIVED
TC 1700
APR 22 2002

RECEIVED
APR 22 2002
TC 1700